To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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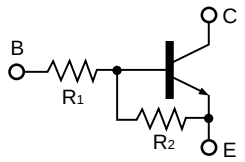
DATA SHEET

COMPOUND TRANSISTOR
FB1 SERIES

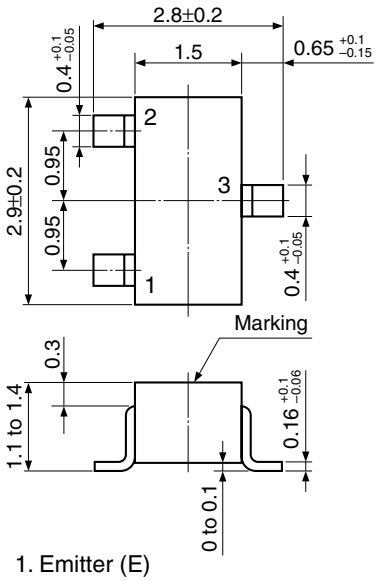
ON-CHIP RESISTOR NPN SILICON EPITAXIAL TRANSISTOR FOR MID-SPEED SWITCHING

FEATURES

- Up to 0.7 A current drive available
- On-chip bias resistor
- Low power consumption during drive
- <R> Package: 3-pin Mini Mold (SC-59)



PACKAGE DRAWING (Unit: mm)



1. Emitter (E)
2. Base (B)
3. Collector (C)

FB1 SERIES LISTS

Products	Marking	R_1 (kΩ)	R_2 (kΩ)
FB1A4A	P30	–	10
FB1L2Q	P31	0.47	4.7
FB1A3M	P32	1.0	1.0
FB1F3P	P33	2.2	10
FB1J3P	P36	3.3	10
FB1L3N	P34	4.7	10
FB1A4M	P35	10	10

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V_{CBO}	30	V
Collector to Emitter Voltage	V_{CEO}	25	V
Emitter to Base Voltage	V_{EBO}	10	V
Collector Current (DC)	$I_{C(DC)}$	0.7	A
Collector Current (pulse) Note	$I_{C(pulse)}$	1.0	A
Base Current (DC)	$I_{B(DC)}$	20	mA
Total Power Dissipation	P_T	200	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Note PW ≤ 10 ms, Duty Cycle ≤ 50%

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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

FB1A4A

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to Base Cut-off Current	I_{CBO}	V_{CB} = 30 V, I_E = 0 A			100	nA
DC Current Gain Note	h_{FE1}	V_{CE} = 2.0 V, I_C = 0.1 A	300			–
	h_{FE2}	V_{CE} = 2.0 V, I_C = 0.5 A	300			–
	h_{FE3}	V_{CE} = 2.0 V, I_C = 0.7 A	135			–
Collector Saturation Voltage Note	$V_{CE(sat)}$	I_C = 0.5 A, I_B = 5 mA		0.27	0.4	V
Low Level Input Voltage Note	V_{IL}	V_{CE} = 5.0 V, I_C = 100 μA			0.3	V
Input Resistance	R_1		–	–	–	Ω
Emitter to Base Resistance	R_2		7	10	13	kΩ

Note PW ≤ 350 μs, Duty Cycle ≤ 2%

FB1L2Q

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to Base Cut-off Current	I_{CBO}	V_{CB} = 30 V, I_E = 0 A			100	nA
DC Current Gain Note	h_{FE1}	V_{CE} = 2.0 V, I_C = 0.1 A	150	400		–
	h_{FE2}	V_{CE} = 2.0 V, I_C = 0.5 A	300	700		–
	h_{FE3}	V_{CE} = 2.0 V, I_C = 0.7 A	135	600		–
Low Level Output Voltage Note	V_{OL}	V_{IN} = 5.0 V, I_C = 0.5 A		0.2	0.3	V
Low Level Input Voltage Note	V_{IL}	V_{CE} = 5.0 V, I_C = 100 μA		0.62	0.3	V
Input Resistance	R_1		329	470	611	Ω
Emitter to Base Resistance	R_2		3.29	4.7	6.11	kΩ

Note PW ≤ 350 μs, Duty Cycle ≤ 2%

FB1A3M

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to Base Cut-off Current	I_{CBO}	V_{CB} = 30 V, I_E = 0 A			100	nA
DC Current Gain Note	h_{FE1}	V_{CE} = 2.0 V, I_C = 0.1 A	80			–
	h_{FE2}	V_{CE} = 2.0 V, I_C = 0.5 A	100			–
	h_{FE3}	V_{CE} = 2.0 V, I_C = 0.7 A	135			–
Low Level Output Voltage Note	V_{OL}	V_{IN} = 5.0 V, I_C = 0.5 A		0.3	0.4	V
Low Level Input Voltage Note	V_{IL}	V_{CE} = 5.0 V, I_C = 100 μA			0.3	V
Input Resistance	R_1		0.7	1.0	1.3	kΩ
Emitter to Base Resistance	R_2		0.7	1.0	1.3	kΩ

Note PW ≤ 350 μs, Duty Cycle ≤ 2%

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FB1F3P

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to Base Cut-off Current	I_{CBO}	V_{CB} = 30 V, I_E = 0 A			100	nA
DC Current Gain Note	h_{FE1}	V_{CE} = 2.0 V, I_C = 0.1 A	300			–
	h_{FE2}	V_{CE} = 2.0 V, I_C = 0.5 A	300			–
	h_{FE3}	V_{CE} = 2.0 V, I_C = 0.7 A	135			–
Low Level Output Voltage Note	V_{OL}	V_{IN} = 5.0 V, I_C = 0.3 A			0.3	V
Low Level Input Voltage Note	V_{IL}	V_{CE} = 5.0 V, I_C = 100 μA			0.3	V
Input Resistance	R_1		1.54	2.2	2.86	kΩ
Emitter to Base Resistance	R_2		7	10	13	kΩ

Note PW ≤ 350 μs, Duty Cycle ≤ 2%

FB1J3P

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to Base Cut-off Current	I_{CBO}	V_{CB} = 30 V, I_E = 0 A			100	nA
DC Current Gain Note	h_{FE1}	V_{CE} = 2.0 V, I_C = 0.1 A	300	600		–
	h_{FE2}	V_{CE} = 2.0 V, I_C = 0.5 A	300	700		–
	h_{FE3}	V_{CE} = 2.0 V, I_C = 0.7 A	135	600		–
Low Level Output Voltage Note	V_{OL}	V_{IN} = 5.0 V, I_C = 0.2 A		0.14	0.3	V
Low Level Input Voltage Note	V_{IL}	V_{CE} = 5.0 V, I_C = 100 μA		0.6	0.3	V
Input Resistance	R_1		2.31	3.3	4.29	kΩ
Emitter to Base Resistance	R_2		7	10	13	kΩ

Note PW ≤ 350 μs, Duty Cycle ≤ 2%

FB1L3N

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to Base Cut-off Current	I_{CBO}	V_{CB} = 30 V, I_E = 0 A			100	nA
DC Current Gain Note	h_{FE1}	V_{CE} = 2.0 V, I_C = 0.1 A	300			–
	h_{FE2}	V_{CE} = 2.0 V, I_C = 0.5 A	300			–
	h_{FE3}	V_{CE} = 2.0 V, I_C = 0.7 A	135			–
Low Level Output Voltage Note	V_{OL}	V_{IN} = 5.0 V, I_C = 0.2 A			0.3	V
Low Level Input Voltage Note	V_{IL}	V_{CE} = 5.0 V, I_C = 100 μA			0.3	V
Input Resistance	R_1		3.29	4.7	6.11	kΩ
Emitter to Base Resistance	R_2		7	10	13	kΩ

Note PW ≤ 350 μs, Duty Cycle ≤ 2%

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FB1A4M

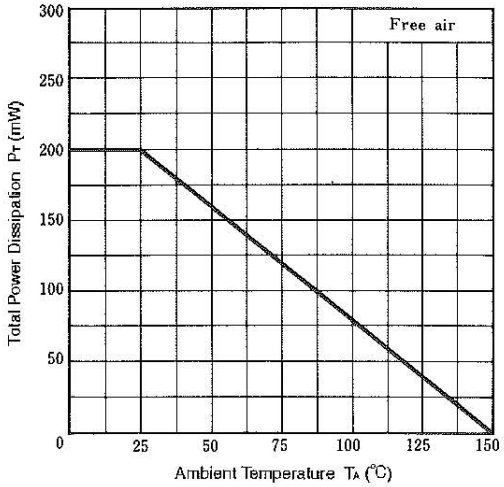
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to Base Cut-off Current	I_{CBO}	V_{CB} = 30 V, I_E = 0 A			100	nA
DC Current Gain Note	h_{FE1}	V_{CE} = 2.0 V, I_C = 0.1 A	300			–
	h_{FE2}	V_{CE} = 2.0 V, I_C = 0.5 A	300			–
	h_{FE3}	V_{CE} = 2.0 V, I_C = 0.7 A	135			–
Low Level Output Voltage Note	V_{OL}	V_{IN} = 5.0 V, I_C = 0.2 A			0.3	V
Low Level Input Voltage Note	V_{IL}	V_{CE} = 5.0 V, I_C = 100 μA			0.3	V
Input Resistance	R_1		7	10	13	kΩ
Emitter to Base Resistance	R_2		7	10	13	kΩ

Note PW ≤ 350 μs, Duty Cycle ≤ 2%

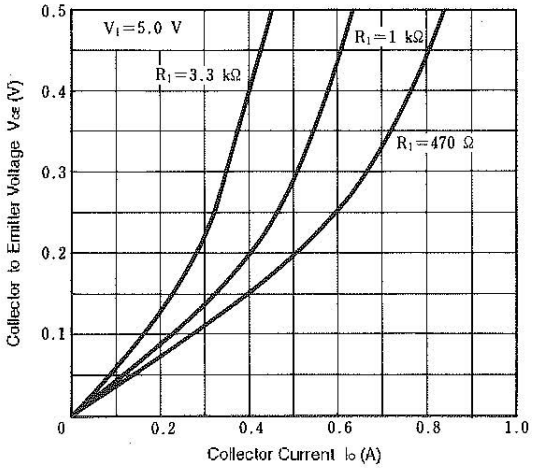
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TYPICAL CHARACTERISTICS (T_A = 25°C)

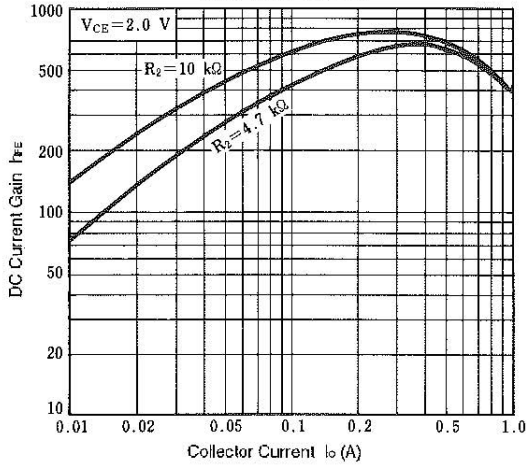
TOTAL POWER DISSIPATION vs.
COLLECTOR CURRENT



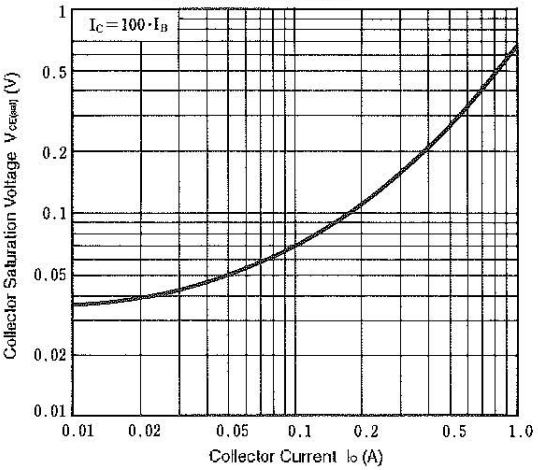
COLLECTOR TO EMITTER VOLTAGE
vs. COLLECTOR CURRENT



DC CURRENT GAIN vs.
COLLECTOR CURRENT



<R> COLLECTOR SATURATION VOLTAGE
vs. COLLECTOR CURRENT



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